UUI: Reusable Spatial Data Services in Unified User Interface at NASA GES DISC

http://disc.gsfc.nasa.gov/uui/

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GES DISC is a data center that provides access to large-scale archives of earth science data.

Also applications and services built on top of the data.
Going forward

Unified User Interface

Context (space, time, data, keywords...)

Information
Visualization
Subset
Search

Data

Data Archive

GUI

Data Services
Unified User Interface (UUI)

Search/find/navigate ANY DATA RESOURCE, while retaining CONTEXT for cross-resource SEAMLESS NAVIGATION:

- Data granules
- Data subsets (in bulk)
- Data visualization in/from Giovanni
- Data Documentation
- Dataset Landing Pages
Data access and available services
Services

• Build around a notion of web services
  • Small, self-contained, web-accessible building blocks
  • Can be reused and chained to build more complex services

• Each service provides a well-defined specification
  • Allows for an easy verification, integration, maintenance
  • JSON WSP as a main vehicle, enhanced based on …
  • OpenSearch / GEO and OGC WPS recommendations

• Legacy services wrapped in JSON WSP
Architecture

Web Page

User Actions

Content View

AngularJS

JSON WSP request

Node.js

JSON WSP response

Query

JS Objects

Mongo DB

Web Server, Built-in services

Database

Legacy Service wrappers

OPeNDAP
SSW
Giovanni

CMR,
Legacy metadata

Metadata
Specifications

Request (POST)

```json
{
  "type": "jsonwsp/request",
  "version": "1.0",
  "methodname": "getSynonyms",
  "args": {
    "keyword": "AOD"
  }
}
```

Response

```json
{
  "type": "jsonwsp/response",
  "version": "1.0",
  "servicename": "Keywords service",
  "method": "getSynonyms",
  "result": ["AOT", "Aerosol Optical Depth"]
}
```

- Request params named based on OpenSearch/GEO
  - start, end, box, etc

- Response is formatted based on OpenSearch as well
  - totalResults, startIndex, items etc.
Service interaction – OGC WPS

Synchronous Job

Asynchronous Job

Source: OGC® WPS 2.0 Interface Standard
Service composition and reuse

- Services are simple POST calls with parameters in => results out
- Easy to wrap as a function in many languages supporting JSON (JavaScript, Python, Perl, etc.)
- Wrapper function can be used as a building block to construct complex services
  - ... Search for data
  - Then Subset the data
  - Then Process the data
  - Then Plot the data ...
Reuse by External Clients

- Easy for external clients to consume services and build composite applications
- Don’t need to know internal protocols and APIs of GES DISC applications
- Implement a single API - use with any service
Challenges and limitations

• Lack of means for automatic discovery and reuse in JSON WSP
  • Lacks semantic information (some relief in OpenSearch GEO)
  • Can’t specify acceptable required/optional combinations for args
  • Needs better customization

• Rigid communication protocol in OGC WPS
  • Does not specify retrieval of intermediate results
  • Can not process / display results of long-running jobs until complete (no piping)
Summary

• New interface provides a simple and modern user experience, replacing and integrating with a number of legacy data services and applications at GES DISC

• Service-based implementation takes advantage of modern technologies and standards
  • High maintainability, evolvability, and forward compatibility

• Services are easy to reuse by partner applications
  • Search, Subset, Regrid, Format
  • Visualization (coming soon)